The Use of Experimental Economics for Public Policy

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Two Examples:

Electricity Auctions
(Research funded by NSF, PSERC (industry), and DOE)

Voluntary Provision of Public Goods
(Research funded by NSF)
Why test electricity auction design using experimental economics?

- The lab is a wind tunnel.
- Participants paid real money in simulated market.
- Examples of new auction designs tested in the field rather than the lab:
  - New Zealand national cellular phone license sold in a second price auction for NZ 5000 when high bid was NZ 7,000,000.
  - California Electricity Markets (40 Billion lost).
  - FERC forced California to try Pay-As-Bid auction in spite of experimental evidence. Made things worse.
What does auction theory tell us?

- The theory makes some very strong assumptions:
  - Sellers do not know each others’ costs
  - Sellers only have or are allowed to sell one unit
  - The auction is run as a one time event (not repeated)

- If these are met, an auction is:
  - Efficient (merit order is preserved) and cost minimizing
  - Cost neutral with respect to the type of auction
Testing Different Types of Auctions
(Necessary because theoretical assumptions are not met)

- Uniform Price Auction
- Discriminative Auction (Pay As Bid)

Source:
Testing the Performance of Uniform Price and Discriminative Auctions
by
Timothy D. Mount, William D. Schulze, Robert J. Thomas, and Ray D. Zimmerman
## PowerWeb: Offer Submission Page

### Offer Submission for Generator 1

<table>
<thead>
<tr>
<th>Block</th>
<th>Capacity (MW)</th>
<th>Marginal Cost ($/MWh)</th>
<th>Offer Price ($/MWh)</th>
<th>Shut down?</th>
<th>Standby Cost ($/hr)</th>
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<tbody>
<tr>
<td>1</td>
<td>50.0</td>
<td>$10.00</td>
<td>$20</td>
<td></td>
<td>$250</td>
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<tr>
<td>2</td>
<td>20.0</td>
<td>$40.00</td>
<td>$40</td>
<td></td>
<td>$100</td>
</tr>
<tr>
<td>3</td>
<td>10.0</td>
<td>$48.00</td>
<td>$40</td>
<td></td>
<td>$50</td>
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<td>4</td>
<td>10.0</td>
<td>$50.00</td>
<td>$</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>5</td>
<td>10.0</td>
<td>$52.00</td>
<td>$</td>
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<td>$</td>
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<tr>
<td>Total</td>
<td>100.0</td>
<td></td>
<td>$100.00</td>
<td></td>
<td>$400</td>
</tr>
</tbody>
</table>

### Additional Information

- Reservation Price ($/MWh): $100.00
- Interest Charged each Period ($) : $1200.00
- Forecasted System Load (MW): 450.0
- Total System Generation Capacity (MW): 600.0
Need a Smart Market: PowerWeb Network

Area 1 Demand: 76.6 MW
Gen 1
Gen 2

Area 2 Demand: 83.9 MW
Gen 6

Area 3 Demand: 39.4 MW
Gen 3
Gen 4

Total System Demand: 200 MW
Uniform Price Auction

- Each supplier submits multiple offers to sell electricity (different quantity/price combinations) into a central auction.

- All offers submitted into the auction are ranked from lowest price to highest price.

- Select the lowest priced offers until supply equals demand.

- The last (highest priced) accepted offer sets the price for all accepted offers.

- Typical offer (supply) curve takes the form of a “hockey stick”.

Offers Submitted by Six Firms into a Uniform Price Auction
Market Prices for a **Uniform** Price Auction with Price **Inelastic** Load
(Average Price $76.71/MWh)
A Natural Question

- Why pay people more than they have offered to sell their electricity for?
- Asked by FERC, CAISO, NYPSC, and now Gov. Spitzer.
- Economists must be stupid!
- Theory says the auction does not matter it will cost the same--cost neutrality--because sellers are smart.
- Since the theoretical assumptions are not met in electricity markets, testing is needed.
Discriminative Auction (Pay As Bid)

- Each supplier submits multiple offers to sell electricity (different quantity/price combinations) into a central auction.

- All offers submitted into the auction are ranked from lowest price to highest price.

- Select the lowest priced offers until supply equals demand.

- Each accepted offer is paid the offered price.
Offers Submitted by Six Generators into a Discriminative Auction
Market Prices for a Discriminative Price Auction with Price Inelastic Load (Average Price $83.02/MWh)
Conclusions

- Prices in the Uniform Price Auction are volatile and substantially above competitive levels.

- Prices in the Discriminative Auction are much less volatile but even higher than the average prices in the uniform price auction.
Voluntary Contributions

Source:
Why Do People Keep Giving?
Evidence on Charitable Contributions from Laboratory and Field Experiments
by
Homa Zarghame, Kent Messer, Harry Kaiser, William Schulze
Motivation

- Charitable contributions of time and money in the U.S. total around $500 Billion each year and remain relatively constant over time. Lab experiments often show under-provision and decay.

- Psychology and economics experiments demonstrates that behavior is also affected by context and framing.

- We explore the question of “why do people keep giving” by:
  - Exploring the effects of framing/context on contributions in the lab;
  - Testing the validity of the laboratory results in a field experiment (in progress).
Baseline Experimental Design: Repeated Public Goods Game

- Groups were composed of seven subjects drawn from undergraduate business classes at Cornell University.

- Experimental session was conducted over ten rounds.

- Each round, each subject endowed with $1 that must be split between Private Account or contributions to Group Account (public good).

- Contributions to the Group Account multiplied by 1.5 and distributed evenly amongst all members of the group (Marginal per capita return = 0.21).
Cheap Talk (C): Group members are given up to 5 minutes before the start of the first round to discuss the VCM. They are not allowed to make deals or threats.

Vote (V): Group members vote anonymously on whether or not to undertake the Group Account. The other option is a Private Lottery where a $1 lottery ticket yields $0 if a flipped coin returns Tails and $2 if Heads. Only outcome of majority vote (not split) is revealed to the group members.

Status Quo (S): The status quo is “not giving” when the default (if no action is taken) is for all money to be in the Private Account; the status quo is “giving” when the default is for all money to be in the Group Account.
5 groups in each of the following treatments:

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Cheap Talk</th>
<th>Vote</th>
<th>Status Quo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment 1</td>
<td>No</td>
<td>No</td>
<td>Not Giving</td>
</tr>
<tr>
<td>Treatment 2</td>
<td>No</td>
<td>No</td>
<td>Giving</td>
</tr>
<tr>
<td>Treatment 3</td>
<td>Yes</td>
<td>No</td>
<td>Not Giving</td>
</tr>
<tr>
<td>Treatment 4</td>
<td>Yes</td>
<td>No</td>
<td>Giving</td>
</tr>
<tr>
<td>Treatment 5</td>
<td>No</td>
<td>Yes</td>
<td>Not Giving</td>
</tr>
<tr>
<td>Treatment 6</td>
<td>No</td>
<td>Yes</td>
<td>Giving</td>
</tr>
<tr>
<td>Treatment 7</td>
<td>Yes</td>
<td>Yes</td>
<td>Not Giving</td>
</tr>
<tr>
<td>Treatment 8</td>
<td>Yes</td>
<td>Yes</td>
<td>Giving</td>
</tr>
</tbody>
</table>
Self-Selection of Status Quo

- Is an externally imposed status quo of giving realistic?

- Automatic Donations:
  - Some public good providers and charity organizations present Automatic Donation as a method of contribution.
  - Donor using Automatic Donation gives provider either bank account or credit card number and specifies amount for provider to take from the account on a periodic (usually monthly) basis.
Automatic and Round-by-Round Donations

- Number of rounds extended to 20, same MPCR and group size

- Participants have two different payment methods to choose from: Round-by-Round and Automatic.

- They are free each round to switch contribution methods.

- If Round-by-Round is selected, they must enter each round the amount they are donating in that round.

- If Automatic Donation is selected, they are free each round to switch the amount automatically donated.

- Participants alternate between lottery and VCM.
Results

All Versions % Donations

- Baseline
- Vote
- Cheap Talk
- Vote & CT
Results: Summary

- Results from the baseline treatment are consistent with past VCM experiments.

- Results from full-context treatment are consistent with expectations from earlier experiments (and actually surpass these expectations with average contributions of 100% maintained over 16 rounds and only reaching a minimum of over 97%).

- Automatic Donation seems to have no effect on contributions in the absence of Cheap Talk.

- When there is Cheap Talk, the presence of Automatic Donation has the same effect as a Status Quo of Giving.
Summary of the Field Study

- Center for the Church and Global AIDS
  - Present information to church groups about HIV/AIDS crisis, particular emphasis on developing countries
    - AIDS orphanage in Kenya
    - Pediatric AIDS center in India
  - Two treatments:
    1. Baseline
    2. CT and Vote: Allow groups to talk about the project, vote on whether or not to undertake it.
  - Have monthly Automatic Donation available as payment method.
  - Send each participant donation card each month, with a $20 limit on per-month contributions
Sample

- St. Luke’s Methodist Church in Indianapolis
- 5000 plus members
- Church paid $25 per participant
- Announced in newsletter
Experiment ran opposite a Colts game!

- Hard time competing with Colts game
- Pastor was in his office watching the game!
- Only 59 participants :-(
- Colts later won the Superbowl
Charity: Worked with Donald Messer, Executive Director of the Center for the Church and Global AIDS
Providing Hope For Children
In An
Age of HIV and AIDS

St. Luke’s United Methodist Church
and the
Center for the Church and Global AIDS
**HIV & AIDS Spreading Globally**

- Next wave: India, China, Nigeria, Ethiopia, & Russia
- Globally almost 50% women
- 58% are women in southern Africa
Increasing Numbers of Orphans

- Over 15 million orphans
- Numbers continue to escalate globally
- Special Christian mandate to care for "widows & orphans"
Help Provide Hope For Children

- 100% of all funds raised today through the Center are shared equally between the orphanage in Kenya and the Pediatric Center in India.
- Thank you for considering a gift today and a commitment for the future, which will help give hope and health to children in in Africa and Asia.
“One By One By One”

- Mother Teresa’s theology: “One by one by one”

- Couldn’t solve all the world’s problems, but she could make a difference
Thank you for considering a gift to help those Jesus called

“the least of these”
Sample split into two separated groups

- Baseline with 27 participants in three sessions

- Cheap talk and vote with 32 participants in three sessions (one group of 7 voted 4/3 to drop out) leaving 25 continuing.
Monthly letter and envelope

Letter duplicates feedback of lab VCM.

Also duplicates features of automatic donation allowing dropping out or changing to round by round.

Each round is now one month.
Preliminary Results: Average Contributions by Month

Average Contributions per Month

<table>
<thead>
<tr>
<th>Month</th>
<th>Dollars</th>
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<tbody>
<tr>
<td>SEPTEMBER</td>
<td></td>
</tr>
<tr>
<td>OCTOBER</td>
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</tr>
<tr>
<td>NOVEMBER</td>
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<tr>
<td>MARCH</td>
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<tr>
<td>APRIL</td>
<td></td>
</tr>
<tr>
<td>MAY</td>
<td></td>
</tr>
</tbody>
</table>

- **Treated (CT and Vote)**
- **Baseline**
Conclusions

- Context/framing can significantly reduce free-riding in repeated public goods games.
- Social norms may explain why people keep giving.
- Voluntary contributions may be more efficient than economists generally accept.